

## SECONDHAND SMOKE

## Parental Smoking May Set Up Children for Atherosclerosis

Children frequently exposed to secondhand tobacco smoke may be at greater risk of developing atherosclerosis as adults, suggests new research published in the March 2010 issue of *Circulation: Cardiovascular Quality and Outcomes*. “Passive smoking has been associated with an increased risk of atherosclerosis in adults by altering arterial structure and lipid profiles, but there is growing evidence the trouble might begin in childhood,” explains first author Katariina Kallio, a research fellow at the Research Centre of Applied and Preventive Cardiovascular Medicine, University of Turku, Finland. “Our study shows changes do occur in the intima-media thickness of the arteries of healthy adolescents exposed to smoke, confirming this fear.”

The study, which involved 494 healthy 13-year-olds, measured three preclinical indicators of atherosclerosis: the carotid and aortic intima-media thickness (i.e., the thickness of the walls of these arteries), flow-mediated dilation of the brachial artery (a measure of endothelial function), and plasma apolipoprotein B (ApoB) levels (a measure of circulating atherogenic lipoproteins).

The researchers divided the children into low-, intermediate-, and high-exposure groups, which were determined on the basis of each child's average serum cotinine level (0.1–0.4 ng/mL, 0.41–0.7 ng/mL, and 0.71–4.1 ng/mL, respectively) as measured at different times since age 8 years. High-resolution ultrasound scans showed the intima-media of the carotid artery was thicker in children in the high- and intermediate-exposure groups than in the low-exposure group. The same was true of the aortic intima-media. In addition, flow-mediated dilation in the brachial artery was significantly reduced in the high-exposure group.

These preclinical signs of atherosclerosis were accompanied by significantly increased ApoB levels in the high-exposure group compared

with the low-exposure group. Their ApoB/ApoA-1 ratios also were significantly higher, a predictor of atherosclerosis and endothelial dysfunction in adults. Associations persisted after accounting for other atherosclerosis risk factors including serum lipids, sex, pubertal status, diastolic blood pressure, and body mass index.

“Intima-media thickness may be increased by a direct toxic effect of tobacco smoke, the enhanced binding of platelets to vessels causing the growth of vascular smooth muscle, or perhaps lipid peroxidation; we are not sure,” says Kallio. “Nor are we sure why ApoB is increased, although we believe liver enzyme function might be involved.”

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“Whether the changes seen are reversible on removing children from smoke exposure, and how long this would take, are also currently unknown,” comments John Cockcroft of the Wales Heart Research Institute, Cardiff University School of Medicine, who was not involved in the study.

The publication of these findings coincides with a 24 March 2010 call by the Royal College of Physicians (RCP) to ban smoking in cars in the United Kingdom to reduce children's exposure to secondhand smoke. Several U.S. states and parts of Australia and Canada already ban smoking specifically in cars carrying children. “What is clear,” says Cockcroft, “is that [this Finnish study] provides further evidence to support the RCP's call for a ban on exposing children to smoke inhalation—a proposal that the authors themselves support.”

Adrian Burton is a biologist living in Spain who also writes regularly for *The Lancet Oncology*, *The Lancet Neurology*, and *Frontiers in Ecology and the Environment*.

## The Beat by Erin E. Dooley

### Immunity Insight: Breastmilk and Allergens

A study by Valérie Verhasselt in a supplement to the February 2010 issue of *The Journal of Pediatrics* yields new insights into how breastmilk helps program the immune system of offspring. The milk of lactating mice exposed to the allergen ovalbumin contained ovalbumin and the immune factor TGF- $\beta$ . Offspring of these mice exposed as adults to ovalbumin were less likely to show symptoms of asthma if their dams had been exposed to the allergen during lactation. The combination of allergen and immune factor in milk appears to be key to producing the protective effect.

### Nzu: From Remedy to Malady?

In December 2009 the FDA issued a national warning advising pregnant and breastfeeding women to avoid consuming nzu, a West African traditional remedy for

morning sickness sold in pellet or powder form around the world. That warning was based on findings from Texas that samples of nzu contained high levels of arsenic and lead. In March 2010 the Guilford County (NC) Department of Public Health also found high levels of lead in samples of nzu (60–80 times the FDA limit), prompting a statewide warning. The remedy also may be called calabash chalk, calabar stone, la craie, argile, or mabele.



Nzu is sold in several different forms.

### Improving Predictions of Climate Change Impacts

In March 2010 the National Science Foundation, along with the Departments of Agriculture and Energy, announced a new 5-year interdisciplinary program to develop high-resolution models for predicting climate change and its associated impacts at a local scale. The program, which received about \$49 million in funding for its first year, is expected to provide models at significantly improved geographic and temporal resolutions that will be able to help decision makers plan strategies for adapting to the health, ecological, economic, and social changes that could result from a rapidly changing climate.

### High TB Rates among the Inuit

A 10 March 2010 news conference in Ottawa, Canada, highlighted findings that the Inuit population of Canada was infected with tuberculosis at more than 30 times the Canadian national average in 2008. Speakers at the conference, who represented Inuit governing agencies, focused on environmental

<http://www.food.gov.uk/>

## MARINE AND COASTAL SCIENCE

## Faster Test for Detecting Contamination of Recreational Waters

Swimmers and surfers face the risk of contracting gastrointestinal illnesses from exposure to water contaminated with human sewage. The current method for monitoring fecal indicator bacteria (FIB) in recreational waters requires collecting water samples, then culturing and counting microbes in the laboratory, a process that takes 24 hours. This delay may expose swimmers to tainted water or, conversely, unnecessarily close beaches that are no longer contaminated. Now engineers at the University of California, Los Angeles (UCLA) have designed a better rapid-detection method that directly analyzes FIB onsite in recreational waters in less than 1 hour.

Called the covalently linked immunomagnetic separation/adenosine triphosphate (Cov-IMS/ATP) technique, the portable process uses magnetic beads linked covalently to antibodies that bind FIB. The bead-captured FIB are ruptured and treated with an enzyme (luciferase) that catalyzes a light-emitting reaction powered by ATP. A luminometer measures the amount of light emitted, which correlates with bacterial concentrations.

UCLA's Jennifer Jay, an associate professor of civil and environmental engineering, graduate student Christine Lee, and coworkers collected ocean samples from a California beach and from freshwater streams that flow into the beach area. They checked for two common FIB—*Escherichia coli* and *Enterococcus*. The Cov-IMS/ATP method correctly identified 87% of *E. coli* and 94% of *Enterococcus* in the samples, producing results similar to standard culture-based methods performed for comparison. Moreover, the new method detected FIB at limits below what the U.S. Environmental Protection Agency deems

healthy for recreational waters. The findings were published online 24 December 2009 ahead of print in the *Journal of Applied Microbiology*.

Other efforts to develop rapid tests for recreational water quality are based on the quantitative polymerase chain reaction (for example, see *EHP* 114:24–28 [2006]). A field test based on Cov-IMS/ATP would be easier to use, according to Mark Gold, president of Heal the Bay, an environmental group in Santa Monica, California, that monitors aquatic habitats. That's because quantitative polymerase chain reaction takes about 3 hours and requires cumbersome equipment, plus samples must be transported to a laboratory.

Now the UCLA team is adapting the method to identify *Bacteroidales* species, microbes that can be definitively linked specifically to human fecal pollution. "*E. coli* and *Enterococcus* are not ideal fecal indicators because they do not tell you the source of the fecal pollution, and they grow naturally in the environment," says Jay. In contrast, bacteria in the *Bacteroidales* family grow only in the intestines of warm-blooded animals, with different species targeting different animals. These bacteria also do not replicate well in the environment. So the detection of *Bacteroidales* signals recent fecal pollution. "Even more important," says Jay, "you can tell whether *Bacteroidales* comes from humans or an animal to target cleanup efforts." The team's measurements of FIB in freshwater streams to test whether the method could track beach pollution to a particular storm drain will be submitted for publication separately.

The Cov-IMS/ATP method could potentially become a tool for beach managers to analyze water samples in the morning and post public health warnings within a few hours. Gold says, "This would protect public health better than the current system, where beaches are closed based on yesterday's results."

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Left to right: Raymond Gehman / © Corbis; © Darren Greenwood/Design Pics/Corbis

factors including overcrowded housing and lack of clean drinking water and affordable nutritious food as primary factors in the disparity; many Inuit communities also lack access to quality medical care. They called on the Canadian government to develop a national strategy specific to the Inuit that provides culturally relevant solutions that address living conditions for Canadian Inuit.

### e-Waste Laws for India

By early May 2010, the Indian Ministry of Environment and Forests expects to approve rules putting responsibility for the disposal of Indian-made electronic products on their manufacturers. The rules were proposed in 2009 by a coalition of environmental advocacy groups and the Indian Manufacturers' Association for Information Technology. India produces more than 300,000 tons of e-waste annually, a figure that may triple by 2020, according to a recent UNEP report. The new regulations would prohibit the cottage industry of dismantling electronics and recovering the valuable metals they contain, but informal recyclers could still find employment by assisting in the collection of e-waste.

### Animals en Masse

*Livestock in a Changing Landscape*, a two-volume report released in March 2010 by a multi-institution collaborative including the FAO, documents how animal production is causing widespread effects on the environment and human health. Livestock worldwide has tripled

over the last 30 years. According to the report, 1.7 billion head of livestock currently occupy more than one-fourth of the land on Earth, and one-third of the Earth's arable land is devoted to crops used to feed these herds. The report reviews several options for more sustainable animal production. "We want people engaged in the livestock industry to look closely at the report and determine what improvements they can make," said report co-editor Harold Mooney.

